GLN Signal Isolator

I. Product Definition

The Qidian GLN Signal Isolator is a core component for the secure transmission of field signals in industrial automation. Designed specifically for analog signals such as 4-20mA and 0-10V, it integrates signal isolation, transmission, noise suppression, and power distribution into a single unit, effectively addressing issues such as field interference, ground loops, and equipment safety.

Four Core Functions

-- Electrical Isolation: Cuts off direct electrical connections between inputs, outputs, and the power supply, eliminating ground potential differences and common-mode interference.

-- Signal Transmission: Converts standard signals and distributes them via multiple outputs, adapting to different interfaces of PLCs, DCS systems, and instruments.

-- Interference Suppression: Suppresses strong electromagnetic interference from sources such as variable frequency drives, motors, and lightning surges to ensure signal integrity.

-- Power Distribution: Provides isolated power supply for two-wire and three-wire transmitters, simplifying field wiring.

II. Working Principle

Simplified Process Flow

Input Acquisition → Signal Modulation → Three-Port Isolation → Signal Demodulation → Stable Output

--Acquires raw 4-20mA/0-10V signals from field sensors;

--Internally modulates signals into magnetic or optical signals to cross isolation barriers;

--Demodulates and restores standard signals on the output side while performing filtering and amplification;

--Achieves complete electrical isolation between input, output, and power supply throughout the entire process.

Core Advantages of Three-Port Isolation

-- Complete electrical isolation between the input circuit, output circuit, and power supply, with no mutual interference:

-- Completely eliminates ground loop currents, resolving signal drift and jitter at the source;

-- High voltage, surges, and interference cannot propagate to the downstream PLC or control board, preventing breakdown and damage;

-- A single-channel failure does not propagate, ensuring overall system stability.

III. Core Value

1. Consequences of Not Using Signal Isolators

Signals are susceptible to interference from ground potential differences, inverters, motors, etc., resulting in glitches, drift, and distortion, leading to inaccurate measurement and control.

High voltages, surges, and static electricity from the field directly enter downstream equipment, potentially causing breakdowns in PLC analog modules, instruments, and sensors.

Long-term operation under strong interference and abnormal electrical stress accelerates equipment aging, increases failure rates, and leads to frequent maintenance.

In hazardous environments such as chemical, oil and gas, and dusty conditions, the lack of effective electrical isolation fails to meet explosion-proof and intrinsically safe safety standards.

Signal mismatches and distribution issues result in complex wiring for one-to-many scenarios, poor compatibility, and difficult system commissioning.

2. Results of Using GLN Signal Isolators

Completely blocks ground loops and common-mode interference, ensuring stable, precise, and distortion-free signal transmission for more reliable control.

3-terminal electrical isolation creates a safety barrier, protecting precision equipment such as PLCs, DCS systems, and instruments from damage caused by high-voltage surges.

Reduces electrical stress on equipment, minimizes unplanned downtime, extends the service life of instruments and control systems, and lowers operational and maintenance costs.

Meets industrial explosion-proof and intrinsically safe requirements, suitable for use in hazardous environments, and complies with safety regulations and acceptance standards.

Supports signal transmission, distribution, and isolation, unifies signal interfaces, simplifies cabling, and enhances system compatibility and scalability.

IV. Key Specifications

4.1 Basic Electrical Specifications

Input Signal Types: 4–20 mA, 0–10 V, 0–5 V, 1–5 V, 0–20 mA

Output Signal Types: 4–20 mA, 0–10 V, 0–5 V, 1–5 V (Supports 1-in-1-out / 1-in-2-out / 2-in-2-out)

Load Capacity: Current output ≤ 500 Ω; Voltage output ≥ 10 kΩ

Input Impedance: Current input ≤ 100 Ω; Voltage input ≥ 1 MΩ

Accuracy Class: ±0.1% F.S. (25°C ± 2°C)

Ripple: ≤ 0.2% F.S.

4.2 Isolation Performance Parameters

Dielectric Strength: ≥1500V AC, 1 min (between input, output, and power supply terminals)

Insulation Resistance: ≥100MΩ @ DC 500V

Electromagnetic Compatibility: Complies with IEC 61326-3 / GB/T 18268

Response Time: ≤100 ms

Temperature Drift: ≤40 ppm/°C

Overload Capacity: 2 times rated continuous current, 10 times rated current / 10 s

4.3 Power Supply & Power Consumption Parameters

Supply Voltage: DC 18–32 V (typically 24 V DC)

Power Consumption at Full Load: Approx. 1.2 W (1 input, 2 outputs); Approx. 3.0 W (2 inputs, 2 outputs)

Power Distribution Output: Open circuit ≤26V; ≥17.5V at 20mA full load (supports isolated power distribution for two-wire transmitters)

Protection Functions: Reverse polarity protection, input overcurrent protection

4.4 Environmental Parameters

Operating Temperature: -20°C to +60°C

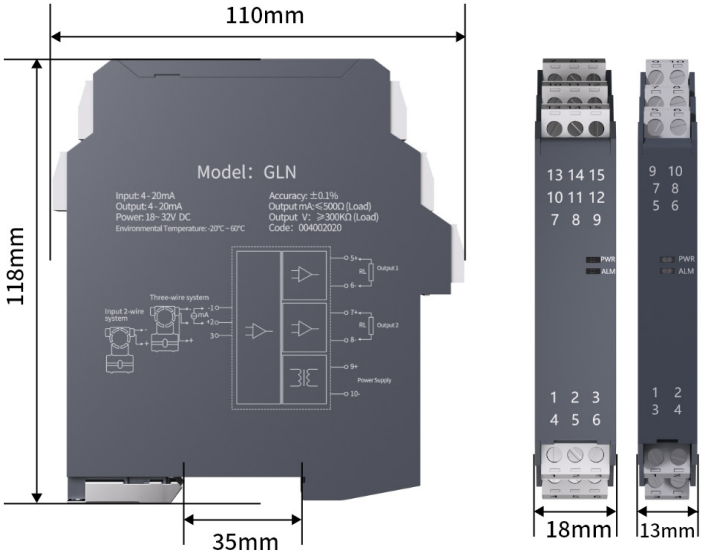
Operating Humidity: 10% RH to 90% RH (non-condensing)

Storage Temperature: -40°C to +85°C

Protection Rating: IP20 (DIN rail mounting)

Explosion-Proof Compliance: Compatible with intrinsically safe barriers; meets standards for hazardous chemical environments in chemical and oil/gas industries

Dimensions: 12.5mm ultra-thin DIN rail type; 35mm standard DIN rail



Mounting Method: 35mm DIN Rail

Dimensions: 118mm x 110mm x 13mm / 118mm x 110mm x 18mm

Indicator Lights: PWR - Power / ALM - Alarm

V. Selection Guide

5.1 Key Selection Criteria

-- Signal Compatibility: Input/output signals must fully match field devices (4–20 mA/0–10 V/0–5 V/1–5 V). Prioritize universal models that support multi-signal auto-adaptation to avoid range mismatches.

-- Channel Configuration: For a single signal transmitted to a single device, select 1 input and 1 output; For a single signal distributed to multiple systems (e.g., PLC + recorder), select 1-in-2-out; for simultaneous acquisition of two independent signals, select 2-in-2-out.

--Power Supply Method: If no additional power source is available on-site, select loop-powered (compatible with two-wire transmitters); if the control room has a stable power supply, select 24V DC independent power supply (typically 18–32V wide-voltage).--Explosion-proof requirements: For hazardous areas such as chemical, oil and gas, or

--Explosion-proof requirements: For hazardous areas such as chemical, oil and gas, or dusty environments, intrinsically safe barriers must be used to comply with Ex ia standards; never substitute with general-purpose models.
--Environmental compatibility: For high temperatures (-20°C to +60°C) and high humidity (≤90% RH, non-condensing), select industrial-grade models; for outdoor or corrosive environments, upgrade protection ratings and materials.

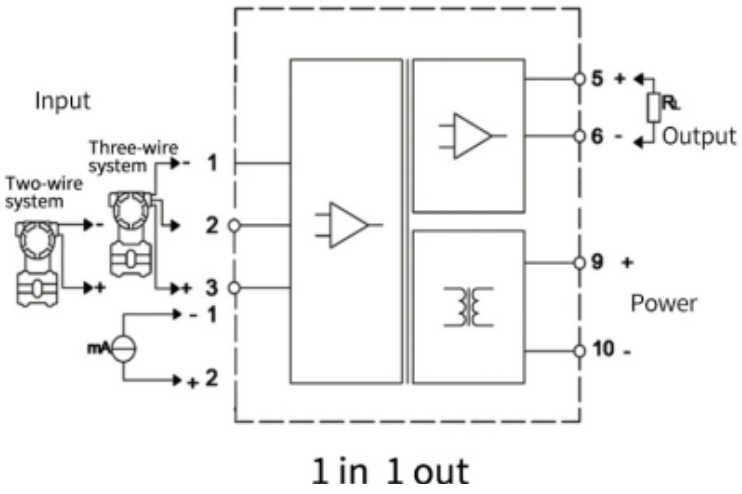
5.2 Common Selection Pitfalls
--Ignoring Isolation Rating: In high-interference environments such as those with motors or variable frequency drives, the isolation voltage must be ≥1500 V AC. Values below this rating are susceptible to breakdown from high-voltage surges, leading to signal drift or equipment burnout.
-- Incorrect Signal Range Selection: Selecting a 0–10 V input model when the field signal is 4–20 mA, or an output range that does not match the PLC/DCS module, directly causes measurement errors (e.g., zero readings or signal overrange).
--Neglecting load matching: Current output loads must be ≤500Ω, while voltage output loads must be ≥10kΩ. Exceeding these limits can cause signal distortion and overheating failures; be sure to verify the load impedance before selection.
--Selecting general-purpose models for explosion-proof environments: Using general-purpose isolators in hazardous areas without intrinsically safe barriers does not meet Ex ia standards, posing an explosion risk and resulting in failure of acceptance testing.
--Confusion between power supply and distribution: Two-wire transmitters require isolated power distribution (≥17.5V at 20mA full load). Selecting a model with an independent power supply by mistake will cause the transmitter to malfunction or produce abnormal signals.

5.3 Customization Recommendations
--Special Signal Adaptation: For field signals such as resistance thermometers (RTDs) or thermocouples, the GLN temperature isolation model can be customized to support Pt100/Pt1000, etc., directly converting them to 4-20mA output without the need for additional adapter modules.
-- Optimization for Non-Standard Conditions: For high-temperature (＞ 60°C) or low-temperature (＜ -20°C) environments, select the wide-temperature model (-40°C to +85°C) and install heat dissipation or thermal insulation kits; in high-dust environments, upgrade the protection rating to IP65 to prevent poor terminal contact.
--Multi-Channel Integration Solutions: For large-scale production lines requiring multi-signal acquisition, custom GLN multi-channel integration modules (e.g., 4-in/4-out or 8-in/8-out) can be configured. These are uniformly mounted on 35mm DIN rails to simplify wiring and maintenance while reducing system costs.
--Redundancy and Backup Configuration: For critical control circuits (such as safety interlocks), dual-channel redundant configurations are adopted. A single failure does not affect system operation, thereby enhancing overall reliability.

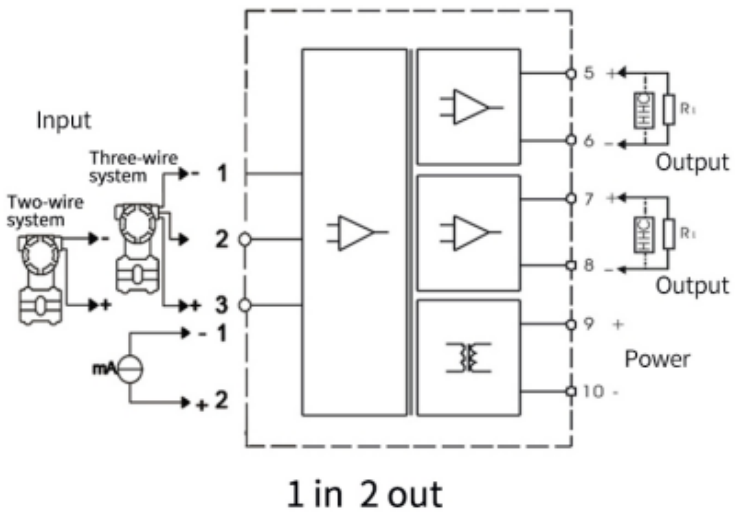
VI. Installation and Commissioning Guidelines
This module serves as a practical field installation guide, fully aligned with the specifications of the Qidian GLN Signal Isolator (1-in-1-out/1-in-2-out/2-in-2-out). It details the entire installation, wiring, and commissioning process to prevent installation errors and ensure stable equipment operation.
6.1 Pre-Installation Preparation
1. Verification of Components
- Core Components: 1 GLN Signal Isolator main unit (confirm the model matches the selection requirements, e.g., GLN-111/112/221);
- Accessories: 1 standard 35mm DIN rail clip, 2 mounting screws, 1 user manual, 1 wiring label;
- Troubleshooting: If the main unit is physically damaged, terminals are loose, or accessories are missing, do not proceed with installation. Contact the manufacturer immediately for a replacement.
2. Environmental Check
- Temperature: The installation area must be within the range of -20°C to +60°C. Avoid heat sources such as variable frequency drives (VFDs) and motors (maintain a distance of ≥30 cm);
- Humidity: Relative humidity must be between 10% RH and 90% RH, with no condensation. In humid environments, install a moisture-proof enclosure or dehumidification equipment;
- Interference: Keep away from strong sources of electromagnetic interference (such as contactors and variable frequency drives) to prevent signal crosstalk;
- Explosion-proof environments: In hazardous chemical areas (chemical/oil and gas), ensure that an intrinsically safe barrier is installed and that the installation area complies with the Ex ia intrinsically safe standard.
3. Tool List
Phillips screwdriver (small), wire strippers (stripping range 0.5–2.5 mm²), multimeter (with current/voltage measurement functions), crimping pliers, electrical tape, cable ties, grounding wire (≥1.5 mm²).
4. Safety Precautions
- Before installation and wiring, ensure all relevant power sources on-site (including power supplies for transmitters, PLCs, and isolators) are disconnected to prevent electric shock;
- Avoid exposing wires during wiring to prevent short circuits and electrical leakage; in explosion-proof environments, ensure wiring is sealed to prevent spark leakage;
- Operators must possess basic electrical knowledge; work in hazardous chemical areas requires relevant explosion-proof operation qualifications.

6.2 Standard Installation Steps
1. Mounting the DIN Rail
1. Verify that the 35mm DIN rail is securely mounted (on the wall or inside the control cabinet) with no looseness or wobbling;
2. Align the latches on the back of the GLN isolator with the DIN rail, snap it into place from top to bottom, and gently press until you hear a “click” to confirm it is securely fastened;
3. Maintain a spacing of ≥5 mm between adjacent devices to allow for heat dissipation and prevent overheating caused by dense installation.
2. Grounding Requirements
- Shielding Wire Handling: For sensor/transmitter signal shielding wires, ground only one end at the isolator (connect to the GND terminal); leave the other end floating. Do not ground both ends (to avoid creating a ground loop);
- Grounding Resistance: Grounding resistance must be ≤4Ω. Use copper-core wire with a cross-sectional area of ≥1.5mm² to ensure reliable grounding;
- Prohibited Actions: Do not connect the isolator’s GND terminal to the power supply negative terminal or the equipment chassis to prevent interference coupling.

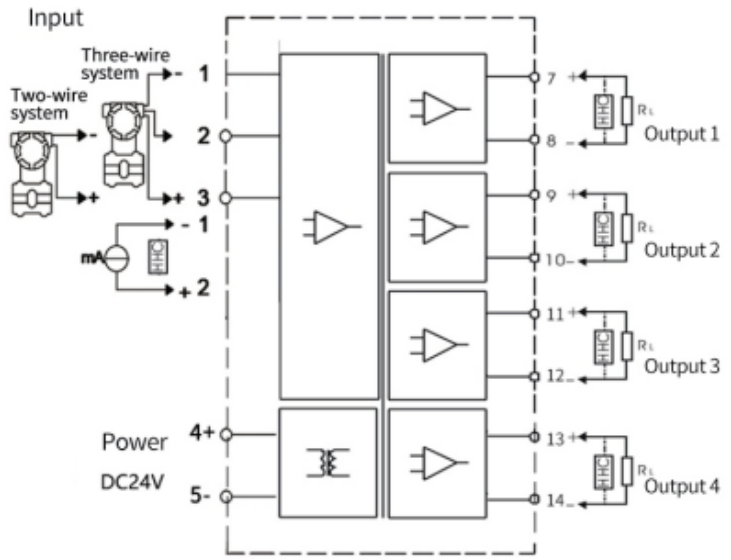
VII. Wiring Diagram



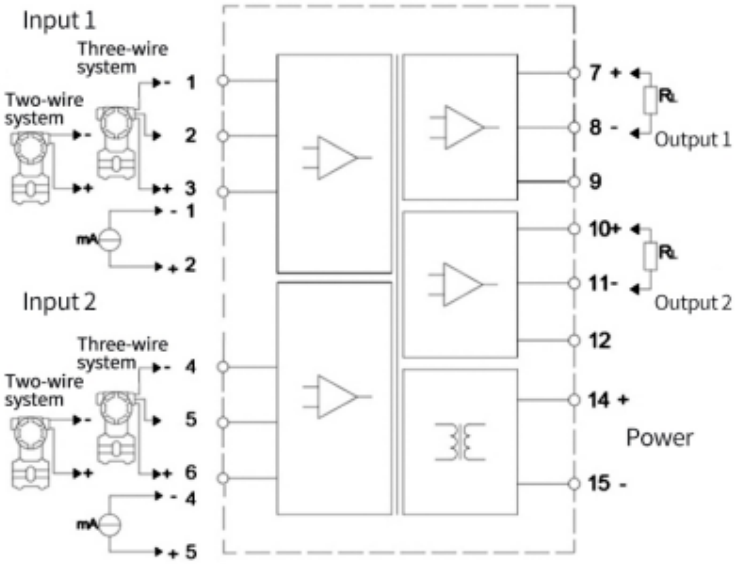
1 in 1 out



1 in 2 out

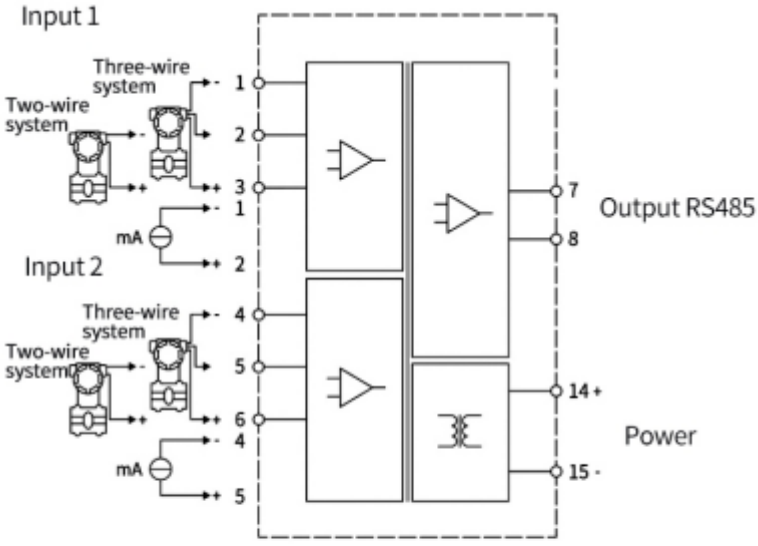


1 in 4 out



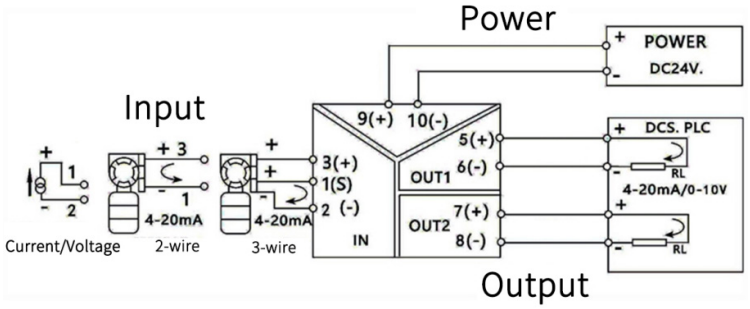
2 in 2 out

2-wire input to 2 (5) Negative 3 (6) Positive
3-wire input to 1 (4) Negative 3 (6) Positive Common 2 (5)
Active outputs to 7 and 8 or 10 and 11.



2 in 1 out

2-wire input to 2 (5) Negative 3 (6) Positive
3-wire input to 1 (4) Negative 3 (6) Positive Common 2 (5)
Active outputs to 7 and 8 or 10 and 11.



VIII. Power-On Debugging Procedure

Before debugging, double-check that all connections are correct and that the power is disconnected. Use a multimeter to monitor the system throughout the debugging process to prevent the fault from escalating.

1. No-Load Test (Preparation Before Power-On)

1. Disconnect the input and output signal lines, leaving only the isolator's power supply connections;

2. Connect a 24V DC power supply and observe the isolator's indicator lights (the PWR light should remain steady, with no error lights). If the lights do not illuminate or are flashing, immediately disconnect the power and check the power supply connections and voltage.

2. Signal Calibration (Core Debugging Step)

1. Reconnect the input and output cables, ensuring they are secure;

2. Connect a standard signal source (such as a 4–20 mA signal generator) to simulate field sensor signals:

- Input 4 mA (lower limit signal); measure the output terminal with a multimeter; it should display 4 mA ±0.1% (accuracy range);
- Input 20 mA (upper limit signal); the output should display 20 mA ±0.1%;
- Input 12 mA (mid-range signal); the output should simultaneously display 12 mA with no significant deviation (calibration is required if the deviation exceeds the tolerance range).

3.Voltage signal (0–10 V/0–5 V) debugging: Similarly, input a signal corresponding to the range; the output should match it synchronously, with an error ≤ ±0.1% F.S.

4. Accuracy calibration method (to be performed when deviation exceeds the tolerance range)

- Required Tools: Standard signal generator, high-precision multimeter (accuracy ≥ 0.05%);
- Calibration Steps:

1. Connect to a 24V DC power supply and let the unit warm up for 5 minutes;

2. Apply a 4mA standard signal and measure the output with a multimeter. If the deviation exceeds ±0.1%, adjust the "ZERO" knob on the side of the isolator until the output reads 4mA;

3. Apply a 20mA standard signal and adjust the "SPAN" knob until the output reads 20mA;

4. Repeat steps 2–3 to confirm that the zero point and span are free of deviation. After calibration is complete, lock the knobs in place and document the calibration results.

8.2 Installation Precautions

- Never exceed the supply voltage: The isolator's operating voltage range is 18–32 V DC. Never connect it to 220 V AC or DC power sources outside this range, as this will immediately destroy the device;
- Avoid high-voltage interference: Input/output signal cables must not be routed through the same conduit or laid side-by-side with 220V AC power lines. Maintain a minimum distance of ≥10 cm to prevent electromagnetic interference;
- Protection against humid environments: In humid or condensation-prone environments, install a moisture-proof enclosure and ensure the isolator's terminal blocks are properly sealed to prevent oxidation and short circuits;
- Strictly prohibit improper grounding: Shielded cables must not be grounded at both ends, nor connected to the power ground; otherwise, ground loop interference will be introduced, causing signal abnormalities;
- Do not overload the wiring: Output loads must meet specifications (current output ≤ 500Ω, voltage output ≥ 10kΩ); exceeding load limits will cause the device to overheat and result in signal distortion;
- Safety precautions for explosive environments: In hazardous chemical areas, direct installation without safety barriers is strictly prohibited. Loose connections and exposed wires are strictly prohibited to prevent sparks that could cause safety incidents.

Additional notes: After installation and commissioning, ensure proper wiring labeling and calibration records are maintained. Conduct regular inspections (every 6 months) to verify wiring integrity and equipment operation status, and promptly remove dust to extend the equipment's service life.

IX. Recommendations for Daily Use and Maintenance

This section focuses on the daily use and long-term maintenance of the Qidian GLN signal isolator, outlining key points for inspection, maintenance, and upkeep. Combined with programmable parameter management methods, these practices reduce equipment failure rates, extend service life, and ensure long-term stable signal transmission.

9.1 Key Points for Daily Inspection (Daily)

-- Indicator Light Observation: During daily inspections, pay close attention to the status of the device's indicator lights to ensure that the PWR (Power) light is solid green, the OUT (Output) light is solid green, and the ERR (Error) light is off. If the ERR light is on, immediately troubleshoot for input signal, wiring, or sensor faults. If the PWR light is flashing or off, check the supply voltage and the polarity of the wiring.

-- Signal Stability Monitoring: Monitor the isolator's output signal via the PLC/DCS system to confirm there are no significant signal jumps or drifts (fluctuation range ≤ ±0.1% F.S.). If signal abnormalities occur, prioritize checking the tightness of wiring and the grounding of shielded cables to eliminate on-site electromagnetic interference.

-- Temperature and Humidity Monitoring: Record the temperature and humidity of the installation area daily to ensure the temperature remains between -20°C and +60°C and the relative humidity between 10% RH and 90% RH (no condensation). If these limits are exceeded, promptly activate dehumidification and cooling equipment to prevent equipment aging or damage caused by abnormal temperature and humidity conditions.

9.2 Regular Maintenance Plan (Performed on a Scheduled Basis)

-- Cleaning Schedule: Clean the isolator once a month. Use a dry, soft cloth to wipe the equipment surface and remove dust from the terminal blocks to prevent dust accumulation, which can cause poor terminal contact and impaired heat dissipation. Do not use wet cloths or corrosive cleaning agents to wipe the equipment to prevent short circuits and damage to the housing.

-- Wiring Tightness Inspection: Inspect the terminal blocks once every 3 months. Use a small Phillips screwdriver to gently tighten any loose screws (apply moderate force to avoid stripping the terminals). Pay special attention to power, input/output signal, and shielding cables to prevent loose connections caused by vibration, which could lead to signal abnormalities.

-- Recommended Accuracy Retest: Perform an accuracy retest on the isolator every 6 months. Follow the "Accuracy Calibration Method" in Module 5 to confirm that the input/output signal error is ≤±0.1% F.S. If the deviation exceeds this range, calibrate promptly, document the calibration, and archive the records for future reference.

9.3 Long-Term Maintenance Tips (Precise Protection, Extended Equipment Lifespan)

-- Dust and Moisture Protection: Place desiccant inside the control cabinet and replace it regularly (once every 3 months); in humid or dusty environments, install a dust and moisture-proof cover on the isolator to prevent dust and moisture from entering the equipment and damaging circuit boards and terminals; do not pile clutter around the equipment, and ensure sufficient space for heat dissipation.

-- Interference Mitigation: Periodically check the distance between on-site interference sources (such as variable frequency drives and motors) and the isolator to ensure it is ≥30 cm. If on-site interference is severe, install filter capacitors at the isolator's input and optimize the shielding wire grounding (ensure single-point grounding and reliable grounding) to reduce signal crosstalk.

-- Protection in Extreme Environments: In high-temperature environments (> 60°C), install heat sinks on the isolator to prevent overheating; in low-temperature environments (< -20°C), install insulation devices inside the control cabinet to prevent internal components from freezing and failing; in explosion-proof environments, regularly inspect the connection seals between the safety barrier and the isolator to ensure compliance with Ex ia intrinsic safety standards, with no looseness or leakage.